

What is Claimed Is:

1. A method of evaluating an incoming data packet at a network switch port, the method comprising:

storing a plurality of templates configured for identifying respective data formats, each template having at least one min term configured for comparing a corresponding prescribed value to a corresponding selected byte of the incoming data packet;

simultaneously comparing, to the selected byte, the min terms that correspond to the selected byte immediately upon receipt of the selected byte by the network switch port;

generating a comparison result that identifies the incoming data packet, based on the comparisons of the min terms to the data bytes of the entire packet received by the network switch port; and

generating a frame tag based on the comparison result as soon as a last bit of the data packet is received at the network switch port.

2. The method of claim 1, wherein the simultaneously comparing step includes:

loading the min terms corresponding to a first of the data bytes into a min term generator;

comparing in parallel the min terms loaded in the min term generator with the first of the data bytes; and

outputting comparison results for the min terms loaded in the min term generator to an evaluation core.

3. The method of claim 2, wherein the simultaneously comparing step further includes loading the min terms corresponding to a second of the data bytes, contiguously following the first of the data bytes, into the min term generator.

4. The method of claim 1, further comprising outputting the frame tag to a switch fabric configured for selectively switching the incoming data packet based on the corresponding frame tag.

5. The method of claim 1, wherein the storing step includes storing each min term in a memory as a table entry, each table entry having a location in the memory based on a location of the corresponding selected byte in the incoming data packet, the table entry including a min term expression portion specifying the corresponding prescribed value and a comparison operand, and a template identifier field that specifies the templates that use the corresponding min term.

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6. The method of claim 5, wherein the generating step includes:
  - temporarily storing results of the comparisons of the min terms to the selected bytes of the incoming data packet;
  - detecting at least one matched template from the plurality of templates based on the results of the comparisons of the min terms; and
  - generating the comparison result based on the detected at least one matched template.
7. The method of claim 6, further including resolving a priority of templates to one final frame tag when more than one template matches the incoming data packet.
8. The method of claim 5, wherein the first of the data bytes corresponds to a first of the data bytes of a packet having a prescribed format, the simultaneously comparing step including evaluating the selected data byte relative to a beginning of the packet having the prescribed format.
9. The method of claim 8, wherein the prescribed format is Internet protocol (IP) format.
10. The method of claim 6, wherein the step of generating the comparison result based on the detected at least one matched template includes:
  - identifying for each of the min terms compared with the incoming data packet a corresponding equation, each equation specifying a unique result for a selected group of the templates; and
  - generating the comparison result by the equation having the detected at least one matched template.
11. A network switch port filter configured for evaluating an incoming data packet, comprising:
  - a min term memory configured for storing min term values, each min term value stored based on a location of a corresponding selected byte of the incoming data packet for comparison, an expression portion specifying a corresponding comparison operation, and a template identifier field that specifies templates that use the corresponding min term;

a min term generator configured for simultaneously comparing a byte of the incoming data packet, immediately upon receipt of the incoming data byte, with the min terms that correspond to the received byte and generating respective min term comparison results; and

an equation core configured for generating a frame tag identifying the incoming data packet based on the min term comparison results relative to the templates.

12. The filter of claim 11, further comprising a frame identifier configured for identifying a type of layer 2 packet, the selected byte of the incoming data packet determined based on the identified type of layer 2 packet.

13. The filter of claim 12, wherein the location of each stored min term value is relative to a beginning of an IP frame within the layer 2 packet.

14. The filter of claim 13, further comprising a min term controller configured for fetching the min terms from the min term memory corresponding to a selected byte of the IP frame within the incoming data packet.

15. The filter of claim 11, wherein the equation core generates the frame tag at a wire rate of the incoming data packet and prior to an end of the incoming data packet.

16. The filter of claim 11, further including a tag priority device configured for resolving a priority of templates to one final frame tag value when more than one template matches the incoming data packet.

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